

201-16004B

I U C L I D

Data Set

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Existing Chemical : ID: 98-88-4
CAS No. : 98-88-4
EINECS Name : benzoyl chloride
EC No. : 202-710-8
TSCA Name : Benzoyl chloride
Molecular Formula : C7H5ClO

Producer related part
Company : Arkema Inc.
Creation date : 21.01.2005

Substance related part
Company : Arkema Inc.
Creation date : 21.01.2005

Status :
Memo :

Printing date : 25.01.2005
Revision date :
Date of last update : 25.01.2005

Number of pages : 62

Chapter (profile) : Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
Reliability (profile) : Reliability: without reliability, 1, 2, 3, 4
Flags (profile) : Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE),
Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1. General Information

Id 98-88-4

Date

1.0.1 APPLICANT AND COMPANY INFORMATION

Type : lead organisation
Name : American Chemistry Council, Benzoates HPV Panel
Contact person :
Date :
Street : 1300 Wilson Boulevard
Town : 22209 Arlington, VA
Country : United States
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
19.11.2004

Type : cooperating company
Name : Arkema Inc.
Contact person :
Date :
Street :
Town :
Country : United States
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

Remark : Formerly ATOFINA Chemicals, Inc.
Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
21.10.2004

Type : cooperating company
Name : Lanxess Corporation
Contact person :
Date :
Street :
Town :
Country : United States
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

Remark : Formerly Bayer Corporation
Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
21.10.2004

Type : cooperating company

1. General Information

Id 98-88-4

Date

Name : Velsicol Chemical Corporation
Contact person :
Date :
Street :
Town :
Country : United States
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia
05.09.2002

1.0.2 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

1.1.0 SUBSTANCE IDENTIFICATION

IUPAC Name :
Smiles Code : O=C(c(cccc1)c1)CL
Molecular formula : C7 H5 Cl1 O1
Molecular weight : 140.57
Petrol class :

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia
17.01.2003

1.1.1 GENERAL SUBSTANCE INFORMATION

Purity type : typical for marketed substance
Substance type : organic
Physical status : liquid
Purity : > 99.5 % v/v
Colour :
Odour :

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia
16.04.2003

1.1.2 SPECTRA

1. General Information

Id 98-88-4

Date 25.01.2005

1.2 SYNONYMS AND TRADENAMES

benzenecarbonyl chloride

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
16.04.2003

1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

1.6.2 CLASSIFICATION

1.6.3 PACKAGING

1.7 USE PATTERN

1.7.1 DETAILED USE PATTERN

1.7.2 METHODS OF MANUFACTURE

1.8 REGULATORY MEASURES

1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES

Short term exposure limit value

Limit value : .05 other: ppm

Time schedule :

Frequency : times

Remark : Ceiling limit
Critical effect: irritation

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.09.2002

(1)

1. General Information

Id 98-88-4
Date 25.01.2005

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

1.11 ADDITIONAL REMARKS

1.12 LAST LITERATURE SEARCH

1.13 REVIEWS

2. Physico-Chemical Data

Id 98-88-4

Date

2.1 MELTING POINT

Value : = -1 °C
Sublimation :
Method : other: not specified
Year :
GLP : no data
Test substance :

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
Reliability : (2) valid with restrictions
Data from Handbook or collection of data
Flag : Critical study for SIDS endpoint
16.12.2003 (15) (22) (36) (51)

Value : -.6 °C
Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
Data from Handbook or collection of data
29.07.1992 (2)

2.2 BOILING POINT

Value : 197.2 °C at 1013 hPa
Decomposition :
Method : other: Handbook value
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
Reliability : (2) valid with restrictions
Data from Handbook or collection of data
Flag : Critical study for SIDS endpoint
05.09.2002 (15) (22) (51)

Value : 198.3 °C at 1013 hPa
Decomposition :
Method : other: Handbook value
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
Data from Handbook or collection of data
05.09.2002 (2)

Value : = 198 °C at 1013 hPa
Decomposition :
Method : other: not specified
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

2. Physico-Chemical Data

Id 98-88-4

Date

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
05.09.2002 (36)

Value : 71 °C at 11.99 hPa
Decomposition :
Method : other: Handbook value
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
05.09.2002 (15)

2.3 DENSITY

Type : density
Value : 1.21 g/cm³ at 20 °C
Method : other: Handbook value
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
Reliability : (2) valid with restrictions
Data from Handbook or collection of data
Flag : Critical study for SIDS endpoint
05.09.2002 (2) (15)

Type : density
Value : 1.22 g/cm³ at 15 °C
Method : other: Handbook value
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
Reliability : (2) valid with restrictions
Data from Handbook or collection of data
05.09.2002 (51)

Type : density
Value : ca. 1.211 g/cm³ at 15.5 °C
Method : other: not specified
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
05.09.2002 (36)

2.3.1 GRANULOMETRY

2. Physico-Chemical Data

Id 98-88-4

Date

2.4 VAPOUR PRESSURE

Value	:	.5 hPa at 20 °C	
Decomposition	:		
Method	:	other (measured): Handbook value	
Year	:		
GLP	:	no data	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
Reliability	:	(2) valid with restrictions Data from Handbook or collection of data	
Flag	:	Critical study for SIDS endpoint	
17.01.2003			(2) (51)
Value	:	= 1.33 hPa at 20 °C	
Decomposition	:		
Method	:	other (measured): not specified	
Year	:		
GLP	:	no data	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
05.09.2002			(36)
Value	:	1.1 hPa at 30 °C	
Decomposition	:		
Method	:	other (measured): Handbook value	
Year	:		
GLP	:	no data	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
05.09.2002			(2)
Value	:	1.33 hPa at 32 °C	
Decomposition	:		
Method	:	other (measured): Handbook value	
Year	:		
GLP	:	no data	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
Reliability	:	(2) valid with restrictions Data from Handbook or collection of data	
17.01.2003			(22)
Value	:	3.7 hPa at 50 °C	
Decomposition	:		
Method	:	other (measured): Handbook value	
Year	:		
GLP	:	no data	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
05.09.2002			(2)

2.5 PARTITION COEFFICIENT

Partition coefficient :
 Log pow : 1.1 at °C
 pH value :
 Method :
 Year :
 GLP :
 Test substance : as prescribed by 1.1 - 1.4

Remark : The partition coefficient for benzoyl chloride was 1.1 using
 a 1,2-dichlorobenzene/water system.

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
 The study was done using the method of Leo, Hansch and
 Elkins with one exception - 1,2-dichlorobenzene was used
 rather than n-octanol because of the formation of esters
 when benzoyl chloride reacts with n-octanol.

Flag : Critical study for SIDS endpoint

16.12.2003

(21)

Remark : No value due to rapid decomposition in water.

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

05.09.2002

(5)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in : Water
 Value : at °C
 pH value :
 concentration : at °C
 Temperature effects :
 Examine different pol. :
 pKa : at 25 °C
 Description :
 Stable :

Remark : n.a. (Decomposition)

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
 Data from Handbook or collection of data

Flag : Critical study for SIDS endpoint

05.09.2002

(51)

Solubility in : Water
 Value : at °C
 pH value :
 concentration : at °C
 Temperature effects :
 Examine different pol. :
 pKa : at 25 °C
 Description :
 Stable :

2. Physico-Chemical Data

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Date

Remark : No value due to decomposition in water.
Decomposition products: - benzoic acid (readily degraded:
half life = 16 s) - Hydrochloric acid

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

05.09.2002

(36)

2.6.2 SURFACE TENSION

2.7 FLASH POINT

Value : = 68 °C
Type : closed cup
Method : other: not specified
Year :
GLP : no data
Test substance :

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

02.03.1998

(36)

Value : 93 °C
Type : closed cup
Method : other: DIN 51755
Year :
GLP :
Test substance :

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

20.08.1992

(5)

2.8 AUTO FLAMMABILITY

Remark : ignition temperature: 600 degree C
Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

13.07.1993

(2)

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

Result : other: explosive limits: lower 2.5 % by vol., upper 27.0 % by vol.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

13.07.1993

(2)

2. Physico-Chemical Data

Id 98-88-4

Date

2.11 OXIDIZING PROPERTIES

2.12 DISSOCIATION CONSTANT

2.13 VISCOSITY

2.14 ADDITIONAL REMARKS

Remark : Henry's law constant: 1.23E-04 atm-cuM/mole.
Estimated using HINE, J. and MOOKERJEE, P.K. (1975) bond
method.
Decomposition occurs in water.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

02.03.1998

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3. Environmental Fate and Pathways

Id 98-88-4

Date

3.1.1 PHOTODEGRADATION

Remark	: Benzoyl chloride may directly photolyse in the atmosphere. The atmospheric half-life for the reaction of benzoyl chloride with photochemically produced hydroxy radicals was estimated to be 2.1 days.													
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia													
Reliability	: (2) valid with restrictions Data from Handbook or collection of data													
Flag 16.12.2003	: Critical study for SIDS endpoint	(48)												
Type	: air													
Light source	:													
Light spectrum	: nm													
Relative intensity	: based on intensity of sunlight													
Remark	: Benzoyl chloride exhibits an absorption maximum of 282.9 nm and a significant absorption at 293.0 nm in methylcyclohexane.													
	<table><tr><td>Absorption coefficient</td><td>Wavelength (nm)</td></tr><tr><td>0.1108E04</td><td>293.0</td></tr><tr><td>0.1752E04</td><td>282.9</td></tr><tr><td>0.1390E05</td><td>249.9</td></tr><tr><td>0.1503E05</td><td>246.6</td></tr><tr><td>0.1627E05</td><td>242.0</td></tr></table>	Absorption coefficient	Wavelength (nm)	0.1108E04	293.0	0.1752E04	282.9	0.1390E05	249.9	0.1503E05	246.6	0.1627E05	242.0	
Absorption coefficient	Wavelength (nm)													
0.1108E04	293.0													
0.1752E04	282.9													
0.1390E05	249.9													
0.1503E05	246.6													
0.1627E05	242.0													
Source 06.03.2003	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	(36) (40)												

3.1.2 STABILITY IN WATER

Type	: abiotic	
t1/2 pH4	: at °C	
t1/2 pH7	: at °C	
t1/2 pH9	: at °C	
Degradation	: 50 % after .3 minute(s) at pH and 2 °C	
Deg. product	: yes	
Method	:	
Year	:	
GLP	: no data	
Test substance	:	
Result	: The rate constant for the hydrolysis is 4×10^{-2} 1/sec at 2 degree C and the hydrolysis half-life is 16 sec. The hydrolysis products are benzoic acid and hydrochloric acid.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
Reliability	: (2) valid with restrictions Meets generally accepted scientific standards, well documented and acceptable for assessment	
Flag 19.11.2004	: Critical study for SIDS endpoint	(30) (34) (36)

3. Environmental Fate and Pathways

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3.1.3 STABILITY IN SOIL

Remark : No data were available, but due to the rapid hydrolysis of benzoyl chloride, the compound is not expected to persist in soil.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.09.2002

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3.2.1 MONITORING DATA

3.2.2 FIELD STUDIES

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type : fugacity model level III
Media : other: air - water - soil - sediment
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other: EPIWin Modeling Program
Year :

Result : Chem Name : Benzoyl chloride
Molecular Wt: 140.57
Henry's LC : 0.000132 atm-m³/mole (Henrywin program)
Vapor Press : 0.363 mm Hg (Mpbpwin program)
Log Kow : 1.44 (Kowwin program)
**Acetyl halides hydrolyze....estimate questionable!
Soil Koc : 11.3 (calc by model)

	Concentration (percent)	Half-Life (hr)	Emissions (kg/hr)	Fugacity (atm)
Air	14.7	144	1000	1.8e-010
Water	43.3	360	1000	1.44e-009
Soil	41.9	360	1000	2.7e-008
Sediment	0.0891	1.44e+003	0	1.16e-009

	Reaction (kg/hr)	Advection (kg/hr)	Reaction (percent)	Advection (percent)
Air	498	1.04e+003	16.6	34.6
Water	589	306	19.6	10.2
Soil	570	0	19	0
Sediment	0.303	0.0126	0.0101	0.000419

Persistence Time: 235 hr
Reaction Time: 426 hr
Advection Time: 526 hr
Percent Reacted: 55.2
Percent Advected: 44.8

Remark : Modeling was performed using equal releases (10,000 kg/hr)

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	and equal distribution to all compartments.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
Reliability	: (2) valid with restrictions Accepted calculation method	
Flag	: Critical study for SIDS endpoint	
05.09.2002		(32)
Type	: Volatility	
Media	:	
Air	: % (Fugacity Model Level I)	
Water	: % (Fugacity Model Level I)	
Soil	: % (Fugacity Model Level I)	
Biota	: % (Fugacity Model Level II/III)	
Soil	: % (Fugacity Model Level II/III)	
Method	:	
Year	:	
Remark	: No data were available, but due to its rapid hydrolysis, volatilization from the water or soil is not expected to be an important factor of the fate of benzoyl chloride.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
06.09.2002		(36)

3.3.2 DISTRIBUTION

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type	: Aerobic	
Inoculum	: predominantly domestic sewage	
Concentration	: 2.4 mg/l related to related to	
Contact time	:	
Degradation	: 92 (±) % after 20 day(s)	
Result	:	
Kinetic of testsubst.	: 5 day(s) 71 % 10 day(s) 90 % 20 day(s) 92 % % %	
Deg. product	:	
Method	: other: in accordance with the later published OECD Guide-line 301 D	
Year	: 1974	
GLP	: No	
Test substance	: as prescribed by 1.1 - 1.4	
Remark	: BOD in proportion to ThOD (theoretical oxygen demand) of 1821 mg O ₂ /g substance	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
Reliability	: (2) valid with restrictions Similar to Guideline study	
Flag	: Critical study for SIDS endpoint	
17.01.2003		(7)

3. Environmental Fate and Pathways

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Date

3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

Remark : No value, due to decomposition.
Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.09.2002

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3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	: static
Species	: Pimephales promelas (Fish, fresh water)
Exposure period	: 96 hour(s)
Unit	: mg/l
LC50	: 34.1
Limit test	:
Analytical monitoring	: yes
Method	:
Year	:
GLP	: no data
Test substance	: other TS: benzoyl chloride, CAS# 98-88-4; purity not noted
Method	: The minnows were raised from controlled breeding stocks at the EPA Newton Fish Toxicology Station, Cincinnati, OH and were observed for a minimum of 14 days prior to testing. The fish were acclimated for 2 days in 100% test dilution water at 22 degree C. Bioassay containers were filled with 12 liters of dilution water. Test substance was added in the form of a stock solution in deionized water. Five fish were placed in each of two duplicate aquaria (10 fish/concentration). At 24 hr intervals, fish were observed for survival, and water tested for dissolved oxygen and temperature. At the end of the 96 hr exposure period, pH and test substance concentration was measured by electron capture gas chromatography (benzene:15% ether extraction). With concentration versus mortality results, 96 hr LC50 and 95% confidence limits were calculated by Probit, Moving average, or Binomial test (depending on the number of partial kills observed).
Test condition	: Reconstituted soft water of the following quality was used: 40 - 48 mg/l hardness as CaCO ₃ 30 - 35 mg/l alkalinity as CaCO ₃ 120 - 160 uS/cm conductivity pH 7.2 - 7.9 temperature = 22 +/- 1 degree C.
Result	: 95% confidence interval = 28.5 - 45.3 mg/l
Remark	: Benzoyl chloride reacted with water to give benzoic acid and HCl, causing a decrease in pH to 5.2 in freshwater and 7.2 in salt water. However, the biological oxygen demand of the benzoic acid was a far more serious effect. In the saltwater test of grass shrimp this was believed to be the major cause of mortality since dissolved oxygen levels plunged below 1 mg/l in direct correspondence to initial benzoyl chloride concentration.
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia
Reliability	: (2) valid with restrictions Meets generally accepted scientific standards, well documented and acceptable for assessment
Flag	: Critical study for SIDS endpoint
19.11.2004	
Type	: static
Species	: Brachydanio rerio (Fish, fresh water)
Exposure period	: 96 hour(s)
Unit	: mg/l

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4. Ecotoxicity

Id 98-88-4

Date 25.01.2005

LC0 : 7.5
LC100 : 10
Limit test :
Analytical monitoring : no
Method : other: Letale Wirkung beim Zebrabaerbling, UBA-Verfahrensvorschlag, Mai1984, Letale Wirkung beim Zebrabaerbling Brachydanio rerio LC0, LC50,LC100, 48-96h
Year : 1987
GLP : no
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted
Method : Lethality Study with the Zebrafish, UBA procedure, May, 1984.
Test condition : ventilated test medium, static system, 10 animals/vessel. The test substance was weighed directly into the dilution water.
Result : geometric mean (LC0/LC100) = 8.7 mg/l
Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
Reliability : (2) valid with restrictions
Meets National standards method (AFNOR/DIN); no analytical monitoring done

16.12.2003

(12)

Type : **static**
Species : Leuciscus idus (Fish, fresh water)
Exposure period : 72 hour(s)
Unit : mg/l
LC0 : 200
LC100 : 500
Limit test :
Analytical monitoring : no
Method : other: Bestimmung der akuten Wirkung von Stoffen auf Fische, Arbeitskreis "Fischtest" im Hauptausschuss "Detergentien" (15.10.73)
Year : 1974
GLP : no
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted
Method : Determination of the acute effect of materials on fish (15.10.73).
Test condition : 11 test medium, ventilated, static system, 2 animals/vessel.
Remark : direct weight
Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
Reliability : (2) valid with restrictions
Test design has some deficiencies. No detailed data given.

06.03.2003

(12)

Type : **static**
Species : Pimephales promelas (Fish, fresh water)
Exposure period : 96 hour(s)
Unit : mg/l
LC50 : 34.7
Limit test :
Analytical monitoring : yes
Method :
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted
Result : 24 hour LC50 = 42.6 mg/l (Pimephales promelas)

4. Ecotoxicity

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Date

Remark : 48 hour LC50 = 34.7 mg/l (Pimephales promelas)
Source : analytical monitoring: GC/ECD
: Bayer Corporation Pittsburgh
: ATOFINA Chemicals Inc. Philadelphia
Reliability : (2) valid with restrictions
: Meets generally accepted scientific standards

16.12.2003

(17)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type : static
Species : Palaemonetes pugio (Crustacea)
Exposure period : 96 hour(s)
Unit : mg/l
LC50 : 180
Analytical monitoring : yes
Method :
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Method : The grass shrimp were collected from wild populations in an estuary near Galveston Bay, Texas and were observed for a minimum of 10 days prior to testing. Bioassay containers were filled with 12 liters of dilution water. Test substance was added in the form of a stock solution in deionized water. Five grass shrimp were placed in each of two duplicate aquaria (10 fish/concentration). At 24 hr intervals, grass shrimp were observed for survival, and water tested for dissolved oxygen and temperature. At the end of the 96 hr exposure period, pH and test substance concentration was measured by electron capture gas chromatography (benzene:15% ether extraction). With concentration versus mortality results, 96 hr LC50 and 95% confidence limits were calculated by Probit, Moving average, or Binomial test (depending on the number of partial kills observed).

Test condition : Synthetic salt water of the following quality was used:

25 +/- 1 g/l salinity
30,00 - 40,000 uS/cm conductivity
pH 8.3 - 8.7
temperature = 22 +/- 1 degree C.

Result : 95% confidence interval = 139.0 - 233.0 mg/l
Remark : Benzoyl chloride reacted with water to give benzoic acid and HCl, causing a decrease in pH to 5.2 in freshwater and 7.2 in salt water. However, the biological oxygen demand of the benzoic acid was a far more serious effect. In the saltwater test of grass shrimp this was believed to be the major cause of mortality since dissolved oxygen levels plunged below 1 mg/l in direct correspondence to initial benzoyl chloride concentration.

Source : Bayer Corporation Pittsburgh
: ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
: Meets generally accepted scientific standards, well documented and acceptable for assessment

Flag : Critical study for SIDS endpoint

17.01.2003

(16) (17)

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species : **Selenastrum capricornutum (Algae)**
Endpoint : other: biomass and growth rate
Exposure period : 72 hour(s)
Unit : mg/l
NOEC : = 6 measured/nominal
Limit test :
Analytical monitoring : yes
Method : OECD Guide-line 201 "Algae, Growth Inhibition Test"
Year : 1984
GLP : yes
Test substance : other TS

Test substance : 12N (37.2%) hydrochloric acid

Test condition : -Test Organisms:
a) Supplier/Source: Selenastrum capricornutum ATCC 22662

- Test Conditions

a) Test Temperature Range: 21.1-22.0°C

b) Growth/Test medium: OECD medium

c) Shaking: 100 rpm

d) Dilution water source: OECD medium

H3BO3 0.185 mg/L

MnCl2_4H2O 0.415 mg/L

ZnCl2 0.003 mg/L

FeCl3_6H2O 0.08 mg/L

Na2EDTA_2H2 0.1 mg/L

CoCl2_6H2O 0.0015 mg/L

Na2MoO4_2H2O 0.007 mg/L

CuCl2_2H2O 0.00001 mg/L

CaCl2_2H2O 18 mg/L

NH4Cl 15 mg/L

KH2PO4 1.6 mg/L

NaHCO3 50 mg/L

MgCl2_6H2O 12 mg/L

MgSO4_7H2O 15 mg/L

e) Exposure Vessel Type: 100 mL medium in a 300 mL conical flask with a cap that allow ventilation

f) Water Chemistry in Test (pH) in one replicate of each concentration (at start and end of the test): 8.0 at start and 8.8 at end of the test (72 h) in the control

g) Stock and Test Solution: Stock solution was not prepared. Each test medium was adjusted to pH with hydrochloric acid and filter-sterilized with 0.45µm membrane filter.

h) Light Levels and Quality during Exposure: 4300-4400 lx, continuous

- Test design:

a) Number of replicates: Triplicate

b) Concentrations: Five pH series (3.5, 4.0, 4.5, 5.0 and 6.0) and a control were tested.

c) Initial cell number in cells/mL: 1 x 10⁴

- Statistical Method:

a) Data Analysis: Graphical method using logarithmic probability paper for EC50, one-way analysis of variance for NOEC

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Result : - Measured pH: pH in one replicate of each concentration (at start and end of the test):

NominalpH	Measured pH
0h	72h
Control8.0	8.8
6.0 6.0	7.9
5.0 5.0	5.1
4.5 4.5	4.8
4.0 4.0	4.3
3.5 3.5	3.7

- Unit [results expressed in what unit]: % growth inhibition after 24, 48, 72h
- Cell density at each flask at each measuring point:

pH	Cell density for each exposure (x 104 cells/mL)			
	0h	24h	48h	72h
Control	1.00	2.96	15.5	70.6
6.0	1.00	2.81	15.7	67.7
5.0	1.00	2.42	10.1	16.7
4.5	1.00	0.986	1.07	1.24
4.0	1.00	0.827	0.925	0.926
3.5	1.00	0.634	0.551	0.508

- Percent biomass/growth rate inhibition per concentration:

Percent growth inhibition			
pH	AUC	0-72h	24-48 h
6.0	2.72	-3.87	0.992
5.0	64.2	13.7	34.8
4.5	99.6	94.6	95.0
4.0	101	93.3	102
3.5	102	110	118

AUC - area under the curve

- EC50 (pH)*(72 hr of exposure):

		Growth rate	
Hr	AUC**	24-48h	0-72h
72	5.1(0.780 mg/L)	4.8(1.55 mg/L)	5.3(0.492 mg/L)

*Values based on nominal pH

** AUC -area under the growth curve (biomass)

The values in parentheses express converted values as 12N HCl.

- NOEC:

Hours of exposure

NOEC (pH)*

Hr	AUC**	24-48h	0-72h
72	6.0(0.097 mg/L)	6.0(0.097 mg/L)	6.0(0.097 mg/L)

*Values based on nominal pH

The values in parentheses express converted values as 12N HCl.

**Source
Reliability**

: ATOFINA Chemicals Inc. Philadelphia
: (2) valid with restrictions
Ministry of Land, Infrastructure and Transport, Japan (1999).
Test was conducted by Chemicals Evaluation and Research Institute, Japan.

Flag
25.01.2005

: Critical study for SIDS endpoint

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**Species
Endpoint**

: **Scenedesmus quadricauda (Algae)**
: growth rate

4. Ecotoxicity

Id 98-88-4

Date 25.01.2005

Exposure period	: 14 day(s)
Unit	: mg/l
EC50	: > 10 measured/nominal
Method	: other
Year	:
GLP	:
Test substance	: other TS
Test substance	: benzoic acid >95% pure, purchased from Aldrich Chemical Co. Milwaukee, Wisconsin, USA
Method	: Growth was assessed by measuring the absorbance of cultures with time using a Bausch and Lomb Spectronic 20 spectrophotometer. The wavelength employed (420 nm) was determined by the method of Sorokin C. (1973. Handbook of Phycological Methods). Sidearm flasks containing 94.9ml of medium and 0.1 ml of test chemical were inoculated with 5 ml of an active culture (containing 6.5 E+4 cyanobacterial and 1.0 E+5 algal cells per ml) and incubated for 12 - 14 days. Five replicates of five concentrations ranging from 0 to 10mg/ml, were used. Optical densities of treated cultures were determined daily and per cent inhibition was calculated relative to the controls. Growth rates were determined by Sorokin C (1973) and EC50 values were determined by probit (Finney DJ. 1971. Probit Analysis, 3rd ed).
Test condition	: Growth was assessed by measuring the absorbance of cultures with time using a Bausch and Lomb Spectronic 20 spectrophotometer. The wavelength employed (420 nm) was determined by the method of Sorokin C. (1973. Handbook of Phycological Methods). Sidearm flasks containing 94.9ml of medium and 0.1 ml of test chemical were inoculated with 5 ml of an active culture (containing 6.5 E+4 cyanobacterial and 1.0 E+5 algal cells per ml) and incubated for 12 - 14 days. Five replicates of five concentrations of test chemical, ranging from 0 to 10 mg/ml, were used. Optical densities of treated cultures were determined daily and per cent inhibition was calculated relative to the controls. Growth rates were determined by Sorokin C (1973) and EC50 values were determined by probit (Finney DJ. 1971. Probit Analysis, 3rd ed).
Remark	: Benzoic acid was included in the benzoate category presented at OECD SIAM 13 in November 2001. Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint.
Source	: ATOFINA Chemicals Inc. Philadelphia
Reliability	: (2) valid with restrictions Meets generally accepted scientific standards, well documented and acceptable for assessment.
Flag	: Critical study for SIDS endpoint
25.01.2005	(44)
Species	: Scenedesmus quadricauda (Algae)
Endpoint	: other: Inhibition of photosynthesis
Exposure period	: 3 hour(s)
Unit	: mg/l
EC50	: = 75 measured/nominal
Limit test	: No
Analytical monitoring	: No
Method	:
Year	: 1982
GLP	: no data
Test substance	: other TS
Test substance	: >95% pure benzoic acid, purchased from Aldrich Chemical Co. Milwaukee, Wisconsin, USA
Method	: Photosynthesis was assayed by following the uptake of (14C)O2 from NaH(14C)O2. Plastic culture flasks contained 9.9ml cell suspension

4. Ecotoxicity

Id 98-88-4

Date

(containing 1.0 E+5 algal cells/ml), 0.1ml radioisotope, and 0.1ml of test chemical. The flasks were incubated for 3 hours and photosynthetic activity assayed. Five replicates of five concentrations, ranging from 0 to 100 mg/ml, were used. Per cent inhibition was calculated relative to photosynthetic activity in the controls. EC50 values were determined by probit (Finney DJ. 1971. Probit Analysis, 3rd ed). Analyses for significant differences ($p=0.05$) were performed using dunnett's test (Winer BJ. 1971. Stat. Prin. in Exp. Design, 2nd ed).

Test condition : 20 degree C; 12 h light/dark-cycle; light intensity 7000 lux

Remark : Benzoic acid was included in the benzoate category presented at OECD SIAM 13 in November 2001.
Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint.

Source : ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Meets generally accepted scientific standards, well documented and acceptable for assessment.

Flag : Critical study for SIDS endpoint

25.01.2005 (43)

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

Type : **aquatic**

Species : activated sludge

Exposure period : 3 hour(s)

Unit : mg/l

EC50 : > 100

Analytical monitoring : No

Method : OECD Guide-line 209 "Activated Sludge, Respiration Inhibition Test"

Year : 1987

GLP : No

Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Guideline study

09.09.2002

(5)

Type : **aquatic**

Species : Photobacterium phosphoreum (Bacteria)

Exposure period : 30 minute(s)

Unit : mg/l

EC50 : 12.24

Analytical monitoring : No

Method : other: Microtox

Year :

GLP :

Test substance :

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

09.09.2002

(25)

4.5.1 CHRONIC TOXICITY TO FISH

4. Ecotoxicity

Id 98-88-4

Date

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

5.1.1 ACUTE ORAL TOXICITY

Type : LD50
Value : 2528 mg/kg bw
Species : Rat
Strain : Wistar
Sex : Male
Number of animals : 10
Vehicle : Other: none
Doses : 1.0, 1.5, 2.0, 2.5, 3.1, 5.0 ml/kg bw (approx. 1210, 1820, 2420, 3030, 3750, 6040 mg/kg bw)
Method :
Year : 1978
GLP : No
Test substance : as prescribed by 1.1 - 1.4

Method : 10 rats/dose, single oral application by gavage, undiluted TS, 6 doses, post application observation time: 14 days, observation for clin. signs, no gross or histopathologic evaluation, statistical method: probit analysis
Result : LD 50 = 2.09 ml/kg bw (approx. 2528 mg/kg bw)

Dose [ml/kg bw]	Time of death	# of rats		
		death/	/with symptoms/	/n
1.0	-	0	0	10
1.5	3 d	2	10	10
2.0	3 hrs-2 d	5	10	10
2.5	3hrs-3 d	6	10	10
3.1	2 d	9	10	10
5.0	3 hrs-2 d	10	10	10

signs of intoxication: sedation, extention spasm, reduced general condition

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
 Comparable to Guideline study; however no performance of gross and histopathologic evaluation

Flag : Critical study for SIDS endpoint

25.01.2005

(6) (29) (36)

Type : LD50
Value : ca. 2618 mg/kg bw
Species : Rat
Strain : other: Spartan
Sex : male/female
Number of animals : 5
Vehicle : other: corn oil
Doses : 500, 1250, 1984, 3150, 5000, 7940 mg/kg bw
Method : other
Year : 1974
GLP : No
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted
Method : Five rats of each sex were used at each dose level except at

5. Toxicity

Id 98-88-4

Date 25.01.2005

Result : 7940 mg/kg only 5 males were used. Volumes of 10 ml/kg were used at all dose levels. Rats were observed continuously during the first 4 hours after dosing, at 24 hours, and once daily for 14 days. Body weights were recorded at study initiation and at 14 days.

: All surviving rats exhibited normal body weight gains during the 14 day observation period.

Dose	# males died	# females died
------	--------------	----------------

500	0/5	0/5
-----	-----	-----

1250	0/5	0/5
------	-----	-----

1984	0/5	3/5
------	-----	-----

3150	1/5	5/5
------	-----	-----

5000	5/5	5/5
------	-----	-----

7940	5/5	
------	-----	--

LD50 (male rats) = 3619 mg/kg (confidence limits = 3008-4353 mg/kg)

LD50 (female rats) = 1900 mg/kg (confidence limits = 1518-2380 mg/kg)

LD50 (combined) = 2618 mg/kg (confidence limits = 2129-3219 mg/kg)

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Meets generally accepted scientific standards, well documented and acceptable for assessment

06.03.2003

(50)

Type : **LD50**

Value : = 2460 mg/kg bw

Species : Rat

Strain :

Sex :

Number of animals :

Vehicle :

Doses :

Method :

Year :

GLP :

Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.03.2003

(23)

Type : **LD50**

Value : = 1900 mg/kg bw

Species : Rat

Strain :

Sex :

Number of animals :

Vehicle :

Doses :

Method :

Year :

GLP :

Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.03.2003

(24)

5.1.2 ACUTE INHALATION TOXICITY

Type	: LC50
Value	: ca. 1.45 mg/l
Species	: Rat
Strain	: Wistar
Sex	: Male
Number of animals	: 10
Vehicle	: other: air
Doses	: 0.190, 0.504, 0.708, 1.453, 1.980 mg benzoyl chloride/l air
Exposure time	: 4 hour(s)
Method	:
Year	: 1979
GLP	: No
Test substance	: as prescribed by 1.1 - 1.4
Method	: 10 males/group exposed to 0.190, 0.504, 0.708, 1.453, 1.980 mg benzoyl chloride/l air, nose-only, for 4 hours at room temperature. Post exposure observation time: 21 days. Necropsy was performed on rats that died during exposure, during observation period and on rats that survived.
Result	: Mortality: no rats died up to 0.708 mg/l; 1.453 mg/l: 5/10 rats died within 1 to 19 days, 1.980 mg/l: 6/10 rats died within 4hrs to 2 days. Signs of intoxication were: inactivity, piloerection, unkempt fur, and difficulties in breathing up to 19 days post exposure in all rats. Rats that died during the test showed dark red colored lungs always with emphysema, some rats showed lung oedema. Rats that survived showed no pathologic findings up to 0.708 mg/l. At higher concentrations lungs with emphysema and mottled, some showed enlarged adrenals.
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia
Reliability	: (2) valid with restrictions Comparable to Guideline study, however no statistical analysis mentioned.
Flag	: Critical study for SIDS endpoint
17.01.2003	
Type	: LC50
Value	: > 2.343 mg/l
Species	: Rat
Strain	: Wistar
Sex	: male/female
Number of animals	: 20
Vehicle	: other: air
Doses	:
Exposure time	: 1 hour(s)
Method	:
Year	: 1979
GLP	: No
Test substance	: other TS: benzoyl chloride, CAS# 98-88-4; purity not noted
Method	: 10 males and 10 females exposed to 2343 mg benzoyl chloride/l air, nose-only, for 1 hour at room temperature, post exposure observation time: 21 days, necropsy was performed on rats that died during exposure and during observation period and on rats that survived
Result	: Mortality: 0/10 (m), 2/10 (f), time of death after 8-11 days. All rats showed difficulties in breathing,

(8)

5. Toxicity

Id 98-88-4

Date 25.01.2005

<p>piloerection, inactivity for up to 19 days. Necropsy at the end of the observation time revealed lungs with emphysema and/or mottled.</p>	
Remark	: mortality: 0/10 (m), 2/10 (f)
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia
Reliability	: (2) valid with restrictions Comparable to Guideline study, however exposure to 1 concentration only for only 1 hour.
Flag	: Critical study for SIDS endpoint
06.03.2003	(8)
Type	: LC50
Value	: 2 - 200 mg/l
Species	: Rat
Strain	: other: Spartan
Sex	: male/female
Number of animals	: 10
Vehicle	:
Doses	: 2.0 and 200 mg/l (aerosol)
Exposure time	: 4 hour(s)
Method	:
Year	:
GLP	: No
Test substance	: other TS: benzoyl chloride, CAS# 98-88-4; technical grade, lot # D11-I40-626; purity not noted
Method	: Groups of 5 male and 5 female rats were placed in a sealed 59 l glass chamber and exposed for 4 hours to a dynamic atmosphere containing mist of the test substance. Addition of test substance was controlled by a Dual Syringe Feeder for 200 mg/l and a Harvard Dual Infusion/Withdrawal pump for 2.0 mg/l. Airflow was regulated with a flowmeter. Rats were observed continually throughout the exposure and for a period of 14 days post-exposure. All rats were necropsied upon death or study termination.
Result	: 2.0 mg/l: 1/10 rats died on the 6th day of the observation period. Clinical signs during exposure: increased followed by decreased motor activity; eye squint; salivation; lacrimation; slight and/or marked dyspnea, nasal porphyrin discharge. Clinical signs (day 1 to 7): decreased motor activity, dyspnea, diarrhea. From day 8-14 surviving rats appeared normal and exhibited normal body weight gains. 200mg/l: All rats died within 4 hours after initiation of the exposure. Clinical signs during exposure: erythema, gasping dyspnea, and those noted for 2.0 mg/l.
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia
Reliability	: (2) valid with restrictions Meets generally accepted scientific standards, well documented and acceptable for assessment
06.03.2003	(50)
Type	: LC50
Value	: > 1.98 mg/l
Species	: Rat
Strain	: Wistar
Sex	: female
Number of animals	: 10

5. Toxicity

Id 98-88-4

Date 25.01.2005

Vehicle : other: air
Doses : 0.190, 0.504, 0.708, 1.453, 1.980 mg benzoyl chloride/l air
Exposure time : 4 hour(s)
Method :
Year : 1979
GLP : No
Test substance : as prescribed by 1.1 - 1.4

Method : 10 females/conc. exposed to 0.190, 0.504, 0.708, 1.453, 1.980 mg benzoyl chloride/l air, nose-only, for 4 hours at room temperature. Post exposure observation time: 21 days. Necropsy was performed on rats that died during exposure, during observation period and on rats that survived.

Remark : Mortality: no rats died up to 0.708 mg/l;
1.453 mg/l: 1/10 rat died within 10 days,
1.980 mg/l: 3/10 rats died within 4hrs to 1 day.
Signs of intoxication were inactivity, piloerection, unkempt fur, and difficulties in breathing up to 19 days post exposure in all rats.
Rats that died during the test showed dark red colored lungs always with emphysema, some rats showed lung oedema. Rats that survived showed no pathologic findings up to 0.708 mg/l. At higher concentrations lungs with emphysema and mottled, some showed enlarged adrenals.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
No statistical analysis mentioned

06.03.2003

(8)

Type : **Other: IRT**
Value :
Species : Rat
Strain : Wistar
Sex : male/female
Number of animals : 10
Vehicle : other: air
Doses : saturated vapor
Exposure time :
Method :
Year : 1979
GLP : No
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Method : 5 male and 5 female rats/group; whole-body exposure; exposure time: 1, 3, 7 hours; post exposure observation time: 14 days. Animals observed for clinical signs; necropsy of rats that died during the experiment and of survivors.

Result : Mortality: 1hr-, 3hr-exp: no deaths,
7hr-exp.: 2/5 female rats died within 1 to 10 days, 3/5 males died within 2-3 days.
Signs of intoxication: From 5 min after the start of the exposure up to 14 days post exposure rats showed difficulties in breathing and inactivity (apathy). Irritant effects were observed of the visible mucous membranes of eyes and nose.
Necropsy of the dead rats: lungs were dark red, emphysema, mottled.
Necropsy of survivors: signs of developing emphysema of the lungs.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

5. Toxicity

Id 98-88-4

Date

Reliability : (2) valid with restrictions
Comparable to Guideline study, however no information on the concentration of the test atmosphere
06.03.2003 (8)

Type : **LC50**
Value : = 1.87 mg/l
Species : Rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Exposure time : 2 hour(s)
Method :
Year :
GLP :
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia
06.03.2003 (24)

5.1.3 ACUTE DERMAL TOXICITY

Type : **LD50**
Value : > 2000 mg/kg bw
Species : Rabbit
Strain : New Zealand white
Sex : male/female
Number of animals : 4
Vehicle : other: neat
Doses : 2000 mg/kg
Method : other
Year : 1974
GLP : No
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; technical grade, lot # D11-I40-626; purity not noted

Method : The hair was clipped from the backs of 2 male and 2 female rabbits; the skin of 1 male and 1 female was abraded. The test compound was applied only once to the back of each animal at a dose of 2000 mg/kg. The area was wrapped with gauze and plastic wrap. 24 hours later, the bandages were removed and the backs washed with tepid water. The rabbits were observed for toxicity and mortality for a period of 14 days.

Remark : None of the rabbits died during treatment and during the observation period. 3/4 rabbits exhibited normal body weight gains. All rabbits exhibited fissuring on the site of application.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Meets generally accepted scientific standards, well documented and acceptable for assessment

Flag : Critical study for SIDS endpoint
06.03.2003 (50)

Type : **LD50**

5. Toxicity

Id 98-88-4

Date

Value : = 790 mg/kg bw
Species : Rabbit
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method :
Year :
GLP :
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.03.2003

(23)

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

Species : Rabbit
Concentration : undiluted
Exposure : Semiocclusive
Exposure time : 4 hour(s)
Number of animals : 6
Vehicle :
PDII : 3.8
Result : irritating
Classification :
Method : other: similar to Draize test
Year : 1974
GLP : No
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; technical grade, lot # D11-I40-626; purity not noted

Method : The hair was clipped from the backs of 3 male and 3 female New Zealand White rabbits; the skin of 3 animals was abraded. 0.5 ml of test material was applied to the back of each animal and the area wrapped with a gauze bandage. Four hours later the bandage was removed and the area washed with tepid water. The skin was evaluated for irritation immediately and at 24 and 72 hours.

Remark : primary irritation scor: 3.8
Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Meets generally accepted scientific standards, well documented and acceptable for assessment

Flag : Critical study for SIDS endpoint

25.01.2005

(50)

Species : Rabbit
Concentration : undiluted
Exposure : Occlusive
Exposure time : 24 hour(s)
Number of animals : 2
Vehicle :
PDII :

5. Toxicity

Id 98-88-4

Date 25.01.2005

Result : corrosive
Classification :
Method : other: see remarks
Year : 1979
GLP : No
Test substance : as prescribed by 1.1 - 1.4

Method : 2 rabbits, 0.5 ml/animal applied on a gauze patch which was fixed with a plaster to the ear for 24 hrs, post exposure observation time: 7 d, no information about evaluation method.

Result : After removal of the plaster: severe erythema and edema up to 7 days (no scores available) and within the last observation days: necrosis.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Deficiencies in the description of test performance.

06.03.2003

(8)

5.2.2 EYE IRRITATION

Species : Rabbit
Concentration : undiluted
Dose : .1 ml
Exposure time : 5 minute(s)
Comment : rinsed after (see exposure time)
Number of animals : 5
Vehicle :
Result : corrosive
Classification :
Method : other: similar to Draize
Year :
GLP : No
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; technical grade, lot # D11-I40-626; purity not noted

Method : 5 rabbits; 0.1 ml/animal was placed into the conjunctival sac of right eye of each rabbit, left eye served as untreated control. Post exposure observation: 1, 24, 48, 72 hours, 7, 14, and 21 days. Evaluation was done with sodium fluorescein.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Meets generally accepted scientific standards, well documented and acceptable for assessment

Flag : Critical study for SIDS endpoint

06.03.2003

(50)

Species : Rabbit
Concentration : undiluted
Dose : .1 ml
Exposure time : 24 hour(s)
Comment : rinsed after (see exposure time)
Number of animals : 3
Vehicle :
Result : corrosive
Classification :
Method : other: similar to Draize

5. Toxicity

Id 98-88-4

Date

Year : 1974
GLP : No
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; technical grade, lot # D11-I40-626; purity not noted

Method : 5 rabbits; 0.1 ml/animal was placed into the conjunctival sac of right eye of each rabbit, left eye served as untreated control. Post exposure observation: 1, 24, 48, 72 hours, 7, 14, and 21 days. Evaluation was done with sodium fluorescein.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Meets generally accepted scientific standards, well documented and acceptable for assessment

06.03.2003

(50)

Species : Rabbit
Concentration : undiluted
Dose : .1 ml
Exposure time :
Comment :
Number of animals : 2
Vehicle :
Result : corrosive
Classification :
Method :
Year : 1979
GLP : No
Test substance : as prescribed by 1.1 - 1.4

Method : 2 rabbits; 100 ul/animal was placed into the conjunctival sac of one eye of each rabbit, post exposure observation time:7 days. Evaluation method not described.

Result : Conjunctiva: severe redness, moderate to severe chemosis up to the end of the observation period;
Iris: slight to moderate swollen and hyperemic;
slight diffuse cornea opacity.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
Deficiencies in the description of test performance.

06.03.2003

(8)

5.3 SENSITIZATION

5.4 REPEATED DOSE TOXICITY

Type :
Species : Rat
Sex : male/female
Strain : Sprague-Dawley
Route of admin. : inhalation
Exposure period : 28 days
Frequency of treatm. : 6 h/d; 5 d/w
Post exposure period : None
Doses : 0, 25, 250, 1200 mg/m3
Control group : Yes

5. Toxicity

Id 98-88-4

Date 25.01.2005

NOAEL	: = 25 mg/m ³
LOAEL	: = 250 mg/m ³
Method	: other
Year	: 1982
GLP	: Yes
Test substance	: other TS
Test substance	: technical grade benzoic acid
Method	: Four groups of rats (10 animals/sex/group) were exposed to a dust aerosol of benzoic acid at concentrations of 0, 25, 250, 1200 mg/m ³ , 6 hrs/day, 5 days/week, 4 consecutive weeks. The animals were observed twice daily, pharmacotoxic signs observed weekly, and their body weights recorded prior to exposure and weekly thereafter. Animals found in a moribund condition were sacrificed. After 4 weeks of exposure, all surviving animals were necropsied and biochemical, hematologic, organ weights and histopathologic evaluations were conducted.
Test condition	: The concentration was generated as a dust aerosol with an IRAD dust generator. The test material (white flakes) was ground in an Oster blender to produce a more respirable particle. Actual exposure concentration was determined by gravimetric techniques. Particle size distribution was determined using Andersen 8 stage cascade impactor. Average particle size was 4.7 µm.
Result	: No compound-related gross lesions were seen in any animal from any dose group. Compound-related microscopic lesions, consisting of an increase of inflammatory cell infiltrate and an increase in the incidence, intensity, and extent of interstitial fibrosis in lungs of rats from all dose groups (but not dose related), were observed. 1200 mg/3: 1 animal/sex died; decreased body weight; decrease in platelets; decreased absolute and relative weights of liver (m) and trachea/lung (f); no significant difference in biochemical parameters. >= 250 mg/m ³ : upper respiratory tract irritation, decreased absolute and relative weights of kidney (f). 0 - 250 mg/m ³ : No deaths; no effects on weight gain; no significant effects on organ weights, biochemical or hematologic parameters.
Remark	: Benzoic acid was included in the benzoate category presented at OECD SIAM 13 in November 2001. Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint.
Source	: ATOFINA Chemicals Inc. Philadelphia
Reliability	: (1) valid without restriction Meets generally accepted scientific method and is described in sufficient detail.
Flag	: Critical study for SIDS endpoint
25.01.2005	(47)
Type	:
Species	: mouse
Sex	: male/female
Strain	: B6C3F1
Route of admin.	: inhalation
Exposure period	: 90 days
Frequency of treatm.	: 6 hours/day, 5 days/week
Post exposure period	: 1 day
Doses	: 10, 20, 50 ppm (nominal)
Control group	: yes, concurrent vehicle
Method	: other: see freetext
Year	: 1983
GLP	: Yes
Test substance	: other TS

5. Toxicity

Id 98-88-4

Date 25.01.2005

Test substance : Hydrogen chloride (>99.99%), CAS No. 7647-01-0
Source: Matheson Gas Company (Code Number 9/82-426)

Method : Route of administration: inhalation (aerosol)
Duration of test: 91 days
Doses/concentration levels: 10, 20, 50 ppm (nominal)
Sex: male and female
Exposure period: 90 days
Frequency of treatment: 6 hours/day, 5 days/week
Control group and treatment: yes, concurrent vehicle: air
Post exposure observation period: one day

Statistical methods:
Parametric data: ANOVA and Turkey's (equal populations) or Scheffe's (unequal populations) Test of multiple comparison
non-Parametric data: Kruskal-Wallis ANOVA and test of multiple comparison
Discontinuous data: CHI-square or Fischer's Exact Probability test

Test condition : Remarks: This experiment was performed in compliance with FDA-GLP (21CFR58).
: Test Subjects
Age at study initiation: 6 - 7 weeks of age
No. of animals per sex per dose: 10 males and 10 females per dose
Study Design
Vehicle: air
Satellite groups and reasons they were added:
Ten males and 10 females of each dose group were sacrificed on the following day of the fourth exposure and microscopically examined for the damage of respiratory tract.
Five males of each dose were sacrificed on the following day of the fourth (five males) and the 90th (five males) exposure and the fixed cranial specimen were shipped to the sponsor.
Clinical observations performed and frequency:
Each animal was observed at least twice daily for incidence of mortality and clinical signs.
Body weight and food consumption were individually measured once a week.
Urine samples collected from 10 male and 10 female animals were analyzed and the following parameters were determined [volume, appearance, occult blood, specific gravity, protein, pH, ketone, glucose].
Blood samples collected from orbital sinus were measured for the following parameters for hematology [erythrocyte count, hemoglobin, hematocrit, total and differential leukocyte counts, platelet and thrombocyte counts, mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration].
Serum samples collected from abdominal aorta were measured for the following parameters for blood chemistry [glutamic pyruvic transaminase, urea nitrogen, total bilirubin, glucose, inorganic phosphorus, calcium, and alkaline phosphatase].

Organs examined at necropsy:
Each animal was pathologically examined at necropsy and following

Result

organs were weighed [brain, heart, kidney, liver, and ovary/testis]. And the following tissues of the control and the highest dose group and [nasal turbinates, trachea, lung] of the low and the mid dose group were examined microscopically [nasal turbinates, trachea, lung, brain, heart, kidney, liver, testis, adrenal, duodenum, eyes and optic nerve, mesenteric lymph nodes, aorta, sternum bone, ear canal, bone marrow, colon, epididymis, jejunum, mandibular lymph nodes, oviducts, ovaries, prostate, skin, pituitary glands, spinal cord, sciatic nerve, peripheral nerve, salivary gland, spleen, thyroid glands, urinary bladder, uterus, thymus, fore and glandular stomach, pancreas, parathyroid, skeletal muscle, seminal vesicle, tongue, femur bone, cecum, esophagus, ileum, lacrimal gland, mammary glands, larynx].

: Body weight:

Summary of Body weight data (B6C3F1 mouse)

week	Mean Body weight (g)							
	male				female			
	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
ini.	21.9	21.9	21.7	21.9	18.5	18.5	18.9	18.7
1	23.3	23.5	23.1	22.1	19.7	19.8	19.8	18.7
2	23.5	23.5	23.0	20.7**	19.4	19.4	19.6	17.2**
3	25.8	26.3	25.5	24.1*	22.2	22.6	21.8	20.6
4	26.7	26.9	26.5	24.4**	22.9	23.4	22.7	21.0*
5	27.7	28.1	27.0	24.7**	23.8	23.8	23.2	21.2**
6	28.5	28.4	27.5	25.5**	24.7	24.1	23.5	21.8**
7	28.7	28.4	27.8	26.0**	25.0	25.2	24.1	22.3**
8	28.2	28.4	28.2	27.0	25.0	24.9	24.6	23.1*
9	29.0	29.1	28.6	27.5*	25.5	25.8	25.2	23.3*
10	29.6	29.9	29.0	26.8**	25.9	26.3	26.1	22.6**
11	30.3	30.1	29.1	27.6**	26.2	26.5	26.0	24.5
12	30.3	29.9	29.5	27.8**	27.0	26.7	26.3	24.0**
13	31.2	31.2	30.3	28.5**	26.9	26.4	26.5	25.0
fin.a)	26.4	26.7	25.7	23.5**	23.4	22.0	22.1	20.5**
gain	9.3	9.3	8.6	6.5**	8.4	7.8	7.6	6.5*

*: Statistically significant difference from the control at the 95% level of confidence ($p < 0.05$).

**: Statistically significant difference from the control at the 99% level of confidence ($p < 0.01$).

Summary of food consumption data (B6C3F1)

week	Mean food consumption (g)							
	male				female			
	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
1	38.9	40.0	41.6	36.4	38.5	44.3	40.2	34.3
2	50.1	49.1	49.1	41.6*	49.5	56.6	45.6	37.8
3	29.4	29.3	32.8	24.5	35.5	37.5	32.8	23.8*
4	45.6	49.8	50.3	42.8	57.7	56.8	49.6	38.6**
5	45.6	51.6	55.7*	43.1	55.2	57.8	50.0	43.0
6	53.4	54.9	54.8	42.3**	57.2	53.0	55.8	42.9*
7	50.1	48.4	46.1	38.3**	50.4	54.1	48.4	36.4**
8	51.9	51.6	50.3	38.9**	53.9	55.5	55.5	38.2**
9	46.6	51.0	52.0	36.9**	54.8	53.2	50.3	35.6**
10	49.3	54.4	51.6	39.1**	56.0	53.0	53.5	39.3**
11	47.4	53.2	50.6	36.6*	55.0	55.2	50.0	34.4**
12	52.3	52.2	49.9	36.6**	53.7	57.1	48.4	35.1**
13	48.8	50.8	53.4	41.2	51.0	58.1	51.6	38.4*

*: Statistically significant difference from the control at the 95% level of confidence ($p < 0.05$).

**: Statistically significant difference from the control at the 99% level of confidence.

Organ weight changes:

Summary of Organ weight data(B6C3F1 mouse)

Organ	male				female			
	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
Brain	0.48	0.50	0.48	0.46	0.50	0.50	0.49	0.48
Heart	0.18	0.20	0.17	0.17	0.14	0.14	0.14	0.14
Kidney	0.53	0.53	0.50	0.48	0.36	0.34	0.34	0.35
Liver	1.35	1.30	1.21	1.15*	1.13	1.02	1.01	1.00
Testis	0.24	0.24	0.23	0.21	-	-	-	-
Ovary	-	-	-	-	0.02	0.02	0.02	0.02

*: Statistically significant difference from the control at the 95% level of confidence (p<0.05).

Histopathology incidence and severity :

Summary of Histopathology data(B6C3F1 mouse)

Organ	male				female			
Incidence	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
	0/10	4/10	0/10	3/10	0/10	4/10	6/10	7/10
Eosinophilic globules of nasal turbinate	-	-	-	4/7	-	-	-	1/10
Ulcerative cheilitis of the lip	-	-	-	7/7	-	-	-	1/10
Pigmented macrophages of the lip	-	-	-	-	-	-	-	-

NOAEL (NOEL): 20 ppm

LOAEL (LOEL): 50 ppm

Actual dose received by dose level by sex (if known):

Time weighted average of analytical concentration for low, middle and high dose group were 9.8, 19.1 and 46.7 ppm, respectively. Each test chamber was sampled approximately once per hour.

Toxic response/effects by dose level:

One male of the highest dose group and one male of the low dose group found dead on the 12th and 20th day of the study, respectively. One female sacrificed on the 92nd day in extremis in the highest dose group.

On the 90th days, significant decrease in body weight was observed in 50 ppm, and decrease in food consumption was observed in 50ppm. Cheilitis with accumulating of hemosiderin-laden macrophages at 50 ppm and eosinophilic globules in epithelium of nasal turbinates in treated mice were observed. Decrease in liver weight was noted in 50ppm male mice. No biologically significant difference was observed in urinalysis, hematology and serum chemistry.

Conclusion

: As histopathologically inflammatory changes were observed in the lowest dose, NOAEL could not be determined. LOAEL is determined to be 10 ppm. NOAEL except for the effects of irritation have been determined to be 10ppm for B6C3F1 mice

Remark

: Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint. No exposure related change were observed in the reproductive organs examined histopathologically. Presented at SIAM 15, 2002.

Source

: ATOFINA Chemicals Inc. Philadelphia

Reliability

: (2) valid with restrictions

Flag

: Critical study for SIDS endpoint

25.01.2005

(14)

Type

:

Species

: rat

5. Toxicity

Id 98-88-4

Date 25.01.2005

Sex : male/female
Strain : other: Crl:CD(SD)Br
Route of admin. : inhalation
Exposure period : 90 days
Frequency of treatm. : 6 hours/day, 5 days/week
Post exposure period : 1 day
Doses : 10, 20, 50 ppm (nominal)
Control group : yes, concurrent no treatment
NOAEL : = 10 ppm
LOAEL : = 50 ppm
Method : other
Year : 1983
GLP : yes
Test substance : other TS

Test substance : Hydrogen chloride (>99.99%), CAS No. 7647-01-0
Source: Matheson Gas Company (Code Number 9/82-426)

Method : Route of administration: inhalation (aerosol)
Duration of test: 91 days

Statistical methods:

Parametric data: ANOVA and Turkey's (equal populations) or
Scheffe's (unequal populations) Test of multiple comparison

non-Parametric data: Kruskal-Wallis ANOVA and test of multiple
comparison

Discontinuous data: CHI-square or Fischer's Exact Probability test

Remarks: This experiment was performed in compliance with FDA-GLP
(21CFR58).

Test condition : Test Subjects
Age at study initiation: 6 - 7 weeks of age
No. of animals per sex per dose: 10 males and 10 females per dose
Study Design

Vehicle: air

Satellite groups and reasons they were added:

Ten males and 10 females of each dose group were sacrificed on the
following day of the fourth exposure and microscopically examined for the
damage of respiratory tract.

Five males of each dose were sacrificed on the following day of the fourth
(five males) and the 90th (five males) exposure and the fixed cranial
specimen were shipped to the sponsor.

Clinical observations performed and frequency:

Each animal was observed at least twice daily for incidence of mortality
and clinical signs.

Body weight and food consumption were individually measured once a
week.

Urine samples collected from 10 male and 10 female animals were
analyzed and the following parameters were determined [volume,
appearance, occult blood, specific gravity, protein, pH, ketone, glucose].

Blood samples collected from orbital sinus were measured for the following
parameters for hematology [erythrocyte count, hemoglobin, hematocrit,
total and differential leukocyte counts, platelet and thrombocyte counts,
mean corpuscular volume, mean corpuscular hemoglobin, and mean

corpuscular hemoglobin concentration].

Serum samples collected from abdominal aorta were measured for the following parameters for blood chemistry [glutamic pyruvic transaminase, urea nitrogen, total bilirubin, glucose, inorganic phosphorus, calcium, and alkaline phosphatase].

Organs examined at necropsy:

Each animal was pathologically examined at necropsy and following organs were weighed [brain, heart, kidney, liver, and ovary/testis]. And the following tissues of the control and the highest dose group and [nasal turbinates, trachea, lung] of the low and the mid dose group were examined microscopically [nasal turbinates, trachea, lung, brain, heart, kidney, liver, testis, adrenal, duodenum, eyes and optic nerve, mesenteric lymph nodes, aorta, sternum bone, ear canal, bone marrow, colon, epididymis, jejunum, mandibular lymph nodes, oviducts, ovaries, prostate, skin, pituitary glands, spinal cord, sciatic nerve, peripheral nerve, salivary gland, spleen, thyroid glands, urinary bladder, uterus, thymus, fore and glandular stomach, pancreas, parathyroid, skeletal muscle, seminal vesicle, tongue, femur bone, cecum, esophagus, ileum, lacrimal gland, mammary glands, larynx].

Result

: Actual dose received by dose level by sex (if known):
Time weighted average of analytical concentration for low, middle and high dose group were 9.8, 19.0 and 46.7 ppm (SD rat), respectively. Each test chamber was sampled approximately once per hour.

Toxic response/effects by dose level:

One female of the highest dose group found dead on the 4th day of the treatment. Slight and transient decrease in food consumption was observed in 10 ppm female, which was not considered to be dose related, and 50ppm male. Minimal to mild rhinitis was observed in the anterior portion of the nasal cavity at the histopathological observation above 20 ppm. No biologically significant difference was observed in urinalysis, hematology and serum chemistry.

Statistical results

Remarks:

Food/water consumption:

Summary of food consumption data (SD rat)

week	male				female			
	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
1	119	132	128	119	98	89	100	93
2	160	158	159	144*	115	102	114	112
3	167	165	165	152	118	93**	119	119
4	126	123	125	110	88	84	82	90
5	170	194	176	162	121	115	127	124
6	181	176	179	172	133	127	136	144
7	175	173	181	167	124	107	128	128
8	168	172	177	159	118	108	123	123
9	172	167	178	161	115	109	124	122
10	171	162	178	163	117	109	120	125
11	173	165	176	159	116	102	116	116
12	169	157	171	173	109	106	115	116
13	169	164	166	153	109	99	118	112

*: Statistically significant difference from the control at the 95% level of confidence (p<0.05).

**.: Statistically significant difference from the control at the 99% level of confidence (p<0.01).

5. Toxicity

Id 98-88-4

Date 25.01.2005

Histopathology incidence and severity :

Summary of Histopathology data((SD rat)

Organ Incidence

male

female

	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
Rhinitis in the nasal cavity	0/10	0/10	3/10	5/10	0	1/10	1/10	4/10

Conclusion : As histopathologically inflammatory changes were observed above 20 ppm, NOAEL was determined to be 10 ppm.

Source : ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions

Flag : Critical study for SIDS endpoint

25.01.2005

(14)

Type :

Species : Rat

Sex : male/female

Strain : Fischer 344

Route of admin. : Inhalation

Exposure period : 90 days

Frequency of treatm. : 6 hours/day, 5 days/week

Post exposure period : 1 day

Doses : 10, 20, 50 ppm (nominal)

Control group : yes, concurrent vehicle

NOAEL : = 20 ppm

LOAEL : = 50 ppm

Method : other

Year : 1983

GLP : Yes

Test substance : other TS

Test substance : Hydrogen chloride (>99.99%), CAS No. 7647-01-0
Source: Matheson Gas Company (Code Number 9/82-426)

Test condition : Statistical methods:
Parametric data: ANOVA and Turkey's (equal populations) or Scheffe's (unequal populations) Test of multiple comparison
non-Parametric data: Kruskal-Wallis ANOVA and test of multiple comparison
Discontinuous data: CHI-square or Fischer's Exact Probability test

This experiment was performed in compliance with FDA-GLP (21CFR58).

Test Subjects

Age at study initiation: 6 - 7 weeks of age

No. of animals per sex per dose: 10 males and 10 females per dose

Study Design

Vehicle: air

Satellite groups and reasons they were added:

Ten males and 10 females of each dose group were sacrificed on the following day of the fourth exposure and microscopically examined for the damage of respiratory tract.

Five males of each dose were sacrificed on the following day of the fourth (five males) and the 90th (five males) exposure and the fixed cranial specimen were shipped to the sponsor.

Clinical observations performed and frequency:

Each animal was observed at least twice daily for incidence of mortality and clinical signs.

Body weight and food consumption were individually measured once a

Result

week.

Urine samples collected from 10 male and 10 female animals were analyzed and the following parameters were determined [volume, appearance, occult blood, specific gravity, protein, pH, ketone, glucose]. Blood samples collected from orbital sinus were measured for the following parameters for hematology [erythrocyte count, hemoglobin, hematocrit, total and differential leukocyte counts, platelet and thrombocyte counts, mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration]. Serum samples collected from abdominal aorta were measured for the following parameters for blood chemistry [glutamic pyruvic transaminase, urea nitrogen, total bilirubin, glucose, inorganic phosphorus, calcium, and alkaline phosphatase].

Organs examined at necropsy:

Each animal was pathologically examined at necropsy and following organs were weighed [brain, heart, kidney, liver, and ovary/testis]. And the following tissues of the control and the highest dose group and [nasal turbinates, trachea, lung] of the low and the mid dose group were examined microscopically [nasal turbinates, trachea, lung, brain, heart, kidney, liver, testis, adrenal, duodenum, eyes and optic nerve, mesenteric lymph nodes, aorta, sternum bone, ear canal, bone marrow, colon, epididymis, jejunum, mandibular lymph nodes, oviducts, ovaries, prostate, skin, pituitary glands, spinal cord, sciatic nerve, peripheral nerve, salivary gland, spleen, thyroid glands, urinary bladder, uterus, thymus, fore and glandular stomach, pancreas, parathyroid, skeletal muscle, seminal vesicle, tongue, femur bone, cecum, esophagus, ileum, lacrimal gland, mammary glands, larynx].

: Actual dose received by dose level by sex (if known):
Time weighted average of analytical concentration for low, middle and high dose group were 9.8, 19.1 and 46.8 ppm, respectively. Each test chamber was sampled approximately once per hour.

Toxic response/effects by dose level:

NO death observed during the test period.

Significant decrease in body weight was observed in 50 ppm male on the 90th days, and decrease in food consumption was observed in 20 and 50ppm. No biologically significant difference was observed in urinalysis, haematology and serum chemistry. Minimal to mild rhinitis were observed in the anterior portion of the nasal cavity at the histopathological observation in all treatment groups.

Body weight:

Summary of Body weight data (F344 rat)

week	male				female			
	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
ini.	111	111	111	112	95	95	96	96
1	140	137	139	134	113	112	113	110
2	168	165	166	158*	125	122	124	119
3	192	189	191	181*	133	132	133	129
4	212	208	208	201	142	142	139	139
5	225	219	220	213*	147	148	145	142
6	240	233	233	224**	153	154	150	148
7	252	244	246	234**	158	159	155	152
8	254	254	253	244	161	165	160	156
9	264	263	264	256	165	168	164	162
10	273	271	271	264	168	172	166	165
11	279	277	278	270	171	174	169	165
12	287	266**	285	275	175	178	174	169
13	291	287	287	280	176	179	174	169
fin.a)	279	275	273	264	166	167	162	159

5. Toxicity

Id 98-88-4

Date

gain 179 176 176 168 81 84 78 73*

*: Statistically significant difference from the control at the 95% level of confidence (p<0.05).

**: Statistically significant difference from the control at the 99% level of confidence (p<0.01).

a): Fasted animal.

Food/water consumption:

Summary of food consumption data (F344 rat)

week	Mean food consumption (g)							
	male				female			
	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
1	91	87	84*	76**	72	68	66**	58**
2	108	105	106	100*	78	77	80	76
3	78	78	73	67**	56	59	56	54
4	114	113	112	112	79	80	75	82
5	119	117	114	114	83	84	84	85
6	110	110	111	109	76	80	77	82
7	113	108	111	109	79	78	73	80
8	112	109	108	104	80	79	77	79
9	105	109	109	114**	91	81	81	82
10	105	107	107	108	75	78	75	81
11	102	108	105	107	71	75	72	75
12	102	109	106	104	73	79	75	76
13	99	107	103	104	73	75	73	78

*: Statistically significant difference from the control at the 95% level of confidence (p<0.05).

**: Statistically significant difference from the control at the 99% level of confidence (p<0.01).

Histopathology incidence and severity :

Summary of Histopathology data((F344 rat)

Organ	Incidence							
	male				female			
	cont.	10ppm	20ppm	50ppm	cont.	10ppm	20ppm	50ppm
	0/10	3/10	7/10	9/10	0/10	3/10	5/10	6/10

Rhinitis in the nasal cavity

Remark : Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint.
No exposure related change were observed in the reproductive organs examined histo-pathologically.

For more detail - please see section 5.4.

Presented at SIAM 15, 2002

Source : ATOFINA Chemicals Inc. Philadelphia
Reliability : (2) valid with restrictions
Flag : Critical study for SIDS endpoint
25.01.2005

(14)

Type :
Species : Mouse
Sex :
Strain :
Route of admin. : Inhalation
Exposure period : 5 months
Frequency of treatm. : 30min/d; 2d/w
Post exposure period :
Doses :

5. Toxicity

Id 98-88-4

Date

Control group :
Method :
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Result : Mice exposed to benzoyl chloride vapor developed pulmonary tumors (3/28) and skin tumors (2/28). However these results were not significantly different from controls.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (3) invalid
Documentation insufficient for assessment

29.10.2004

(56)

Type :
Species : mouse
Sex : female
Strain : other: Specific-Pathogen-Free (SPF) ICR
Route of admin. : dermal
Exposure period : 41 w; 50 w
Frequency of treatm. : 3/w 4 w, 2/w 37 w; 2/w 50 w
Post exposure period : 51- 80 w
Doses : 5 ul, 10 ul; 2.3 ul /animal/painting
Control group : yes
Method :
Year :
GLP : no data
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Result : For a few minutes after application: marked irritation of the eyes, the skin, and the respiratory system, elevated motor activities; at the painted area: erythema, swelling, later alopecia, induration, marked keratinization, ulcers and/or necrosis of the epidermis.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (3) invalid
Documentation insufficient for assessment

29.10.2004

(19) (20)

Type :
Species : mouse
Sex : no data
Strain : other: C57 black
Route of admin. : other: intradermal injection
Exposure period : 4 d
Frequency of treatm. : daily
Post exposure period : 24 w
Doses : 5 mg/animal
Control group : no data specified

Result : no depigmentation

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (3) invalid

29.10.2004

(3)

5.5 GENETIC TOXICITY 'IN VITRO'

5. Toxicity

Id 98-88-4

Date 25.01.2005

Type : **Ames test**
System of testing : Salmonella typhimurium TA 98, TA 100, TA 1535, TA 1537
Test concentration : (1) 0,15, 30, 60, 120, 240, 480 ug/tube; (2) 0, 75, 150, 300, 600, 1200 ug/tube; (3) 225, 450, 900, 1800, 3600 ug/tube; (4) 0, 225, 450, 900, 1800, 3600 ug/tube
Cycotoxic concentr. : from 1200 ug/tube; substance precipitation at 450 ug/tube and above
Metabolic activation : with and without
Result : negative
Method : other: in agreement with OECD 471, preincubation method, solvent: acetone
Year : 1988
GLP : yes
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

Reliability : (1) valid without restriction
 GLP Guideline study

Flag : Critical study for SIDS endpoint

06.03.2003

(10)

Type : **Ames test**
System of testing : Salmonella typhimurium TA98, TA100, TA1535, TA1537, TA1538, D4
Test concentration : 0.0001 - 1 ul/plate
Cycotoxic concentr. : 1 ul/plate
Metabolic activation : with and without
Result : negative
Method : other: similar to OECD Guide-line 471
Year :
GLP : no
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Remark : S9 activation homogenate was prepared from Aroclor 1254-induced Sprague-Dawley adult male rat liver.
 Negative control: DMSO (50 ul/plate).
 Positive controls (non-activated):
 TA-1535, TA-100: ethylmethane sulfonate (10 ul/plate)
 TA-1537: quinacrine mustard (10 ug/plate)
 TA-1538, TA-98: 2-nitrofluorine (10 ug/plate)
 Positive controls (activated):
 all strains: 2-anthramine (2.5 ug/plate)

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

Reliability : (2) valid with restrictions
 Comparable to Guideline study

Flag : Critical study for SIDS endpoint

06.03.2003

(49)

Type : **Ames test**
System of testing : Salmonella typhimurium TA 98, TA 100
Test concentration : 0.1, 1, 10 umole/plate
Cycotoxic concentr. :
Metabolic activation : without
Result : ambiguous
Method : EPA OTS 798.5265
Year :
GLP : no
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted; purchased from Eastman Organic Chemicals, Rochester, NY, USA

Result : Benzoyl chloride was mutagenic for TA98 only.

Source : Bayer Corporation Pittsburgh

5. Toxicity

Id 98-88-4

Date

06.02.2003

ATOFINA Chemicals Inc. Philadelphia

(13)

Type : **Escherichia coli reverse mutation assay**
System of testing : Escherichia coli H/r30R, Hs30R
Test concentration :
Cycotoxic concentr. :
Metabolic activation : no data
Result : negative
Method :
Year :
GLP :
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

09.09.2002

(26)

Type : **Ames test**
System of testing : Salmonella typhimurium G46, TA1535, TA100, C3076, TA1537, D3052, TA1535,TA98
Test concentration :
Cycotoxic concentr. :
Metabolic activation : with and without
Result : negative
Method :
Year :
GLP : no
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Remark : Gradient plate technique was used which results in a range of concentrations over which chemically-induced mutant colonies are present.

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

06.02.2003

(31)

Type : **Escherichia coli reverse mutation assay**
System of testing : E. coli WP2, WP2 uvrA-
Test concentration :
Cycotoxic concentr. :
Metabolic activation : with and without
Result : negative
Method :
Year :
GLP : no
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Remark : Gradient plate technique was used which results in a range of concentrations over which chemically-induced mutant colonies are present.

Source : Bayer Corporation Pittsburgh
 ATOFINA Chemicals Inc. Philadelphia

06.02.2003

(31)

Type : **Escherichia coli reverse mutation assay**
System of testing : E. coli WP2 B/r try, WP2 try hcr
Test concentration :
Cycotoxic concentr. :
Metabolic activation : with and without
Result : negative
Method :

5. Toxicity

Id 98-88-4

Date

Year	:		
GLP	:	no	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted; purchased from Tokyo Kasei Co. Ltd.	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
06.02.2003			(54)
Type	:	Ames test	
System of testing	:	Salmonella typhimurium TA98, TA100, TA104	
Test concentration	:	up to 1000 ug/plate	
Cycotoxic concentr.	:		
Metabolic activation	:	with and without	
Result	:	positive	
Method	:	other: preincubation method	
Year	:	1996	
GLP	:	no data	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
09.09.2002			(35)
Type	:	Bacterial gene mutation assay	
System of testing	:	Escherichia coli WP2uvrA/pKM101	
Test concentration	:	up to 1000 ug/plate	
Cycotoxic concentr.	:		
Metabolic activation	:	with and without	
Result	:	positive	
Method	:	other: preincubation method	
Year	:	1996	
GLP	:	no data	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
09.09.2002			(35)
Type	:	Bacillus subtilis recombination assay	
System of testing	:	B. subtilis H17 (Rec+), M45 (Rec-)	
Test concentration	:		
Cycotoxic concentr.	:		
Metabolic activation	:	with and without	
Result	:	negative	
Method	:		
Year	:		
GLP	:	no	
Test substance	:	other TS: benzoyl chloride, CAS# 98-88-4; purity not noted; purchased from Tokyo Kasei Co. Ltd.	
Source	:	Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
06.02.2003			(54)

5.6 GENETIC TOXICITY 'IN VIVO'

Type	:	Micronucleus assay
Species	:	mouse
Sex	:	male/female

5. Toxicity

Id 98-88-4

Date

Strain :
Route of admin. : gavage
Exposure period : once
Doses : 0, 1750 mg/kg bw dissolved in corn oil
Result : negative
Method : OECD Guide-line 474 "Genetic Toxicology: Micronucleus Test"
Year :
GLP : yes
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity = 99.97 %

Result : There were no indications of a clastogenic effect on the chromosomes of the bone marrow erythroblasts.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (1) valid without restriction
GLP Guideline study

Flag : Critical study for SIDS endpoint

17.01.2003

(11)

5.7 CARCINOGENICITY

Species : **mouse**
Sex : female
Strain : other: Specific-Pathogen-Free (SPF) ICR
Route of admin. : dermal
Exposure period : 43 w
Frequency of treatm. : 3/w 4 w, 2/w 39 w
Post exposure period : no
Doses : 5 ul (in 5 ul benzene), 10 ul /animal/painting
Result : negative
Control group : yes
Method :
Year :
GLP :
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Method : Two skin painting studies were performed: 10 ul (12.1mg) was applied for 47 weeks.

Result : 5 ul-group: 10 animals, 143 d after first application first skin papilloma; 10 ul-group: 10 animals; 2/10 (5 ul), 3/10 (10 ul) with tumors: skin-papilloma and -carcinoma, lung-adenoma. These tumor incidences are not statistically significant as treatment-related carcinogenic effects.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

25.01.2005

(19) (20)

Species : **mouse**
Sex : female
Strain : other: Specific-Pathogen-Free (SPF) ICR
Route of admin. : dermal
Exposure period : 50 w
Frequency of treatm. : 2/w
Post exposure period : 51 - 80. w
Doses : 2.3 ul/animal/painting in benzene
Result : negative
Control group : yes
Method :
Year :
GLP :

5. Toxicity

Id 98-88-4

Date 25.01.2005

Test substance : other TS: benzoyl chloride, CAS# 98-88-4; commercial grade, obtained from Wako Pure Chemical Industries Co. Ltd., Tokyo

Method : The backs of the mice were clipped free of hair. Benzene was used as the vehicle control. In one experiment, 10 ul (neat) or 5 ul (1:1 with benzene) was administered to the dorsal skin of 3-week old weanling mice with a micropipette 3 times/week for 4 weeks, then twice a week for 9.8 months. Mice were necropsied at 9.8 months. In the second experiment, 2.3 ul (diluted to 25ul with benzene) was administered to 7-week old mice 2 times/week for 50 weeks (11.7 months). At 18.7 months, mice were sacrificed and completely necropsied. After gross examination, organs and tissues were prepared for histological examination.

Result : 20 animals, 364 days after first application of 2,3 ul to first skin papilloma (143 days with 5 ul); in the low dose group : 2/20 skin-carcinomas; 5/20 lung-adenomas; mortality at the termination of the experiment = 5 %. These tumor incidences are not statistically significant as treatment-related carcinogenic effects.

Dose	# animals	# skin tumors	# lung tumors
Control	30	0	2
10 ul	10	0	3
5 ul	10	1	0
2.3 ul	20	2	5

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

25.01.2005

(19) (20)

Species : **Mouse**

Sex : no data

Strain : no data

Route of admin. : Inhalation

Exposure period : 20 w

Frequency of treatm. : 30 min/d, 2 d/w, 5 months

Post exposure period : several months

Doses : saturated vapor

Result : Negative

Control group : Yes

Method :

Year :

GLP : no data

Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Method : Mice were exposed to benzoyl chloride vaporized at 50 degree Celsius for 30 minutes/day, 2 days/week for 5 months. Each animal was then observed for several months without subsequent exposures.

Result : Compared to the control, no significant increase in the incidence of pulmonary tumors and skin tumors.

Remark : article in Japanese with English abstract

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

Reliability : (4) not assignable
Original reference in foreign language; Abstract in English

25.01.2005

(56)

Species : **Mouse**

Sex : Female

Strain : other: ICR-JCL

Route of admin. : Inhalation

Exposure period : 20 w

5. Toxicity

Id 98-88-4

Date

Frequency of treatm. : 30 min, 2/w
Post exposure period : 56 w
Doses : 1.6 ppm
Result :
Control group : no data specified
Method :
Year :
GLP :
Test substance : other TS: benzoyl chloride, CAS# 98-88-4; purity not noted

Result : after 24 w: no lesions or tumors; after 40 w: 2 skin papillomas, epithelial proliferation of the trachea; after 56 w: lung adenocarcinomas, lung adenoma

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

09.09.2002

(55)

Species : **Mouse**
Sex : Female
Strain : ICR
Route of admin. : inhalation
Exposure period : 20 w
Frequency of treatm. : 30 min, 2/w
Post exposure period : 20 w
Doses : 6.8 ppm
Result :
Control group : no data specified
Method :
Year :
GLP :
Test substance :

Result : no lung cancer; trachea and intra-pulmonary bronchi: mild adenoid proliferation

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

09.09.2002

(46)

5.8.1 TOXICITY TO FERTILITY

Type : **other: 90 day toxicity**
Species : Rat
Sex : male/female
Strain : Sprague-Dawley
Route of admin. : inhalation
Exposure period : 90 days
Frequency of treatm. : 6 hours/day, 5 days/week
Premating exposure period
Male :
Female :
Duration of test : 91 days
No. of generation :
studies
Doses : 10, 20, 50 ppm (nominal)
Control group :
Method : other
Year :
GLP : Yes
Test substance : other TS

5. Toxicity

Id 98-88-4

Date

Test substance	: Hydrogen chloride (>99.99%), CAS No. 7647-01-0 Source: Matheson Gas Company (Code Number 9/82-426)
Remark	: Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint. No exposure related change were observed in the reproductive organs examined histo-pathologically. For more detail - please see section 5.4.
Source	: Presented at SIAM 15, 2002 Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia
Reliability Flag	: (2) valid with restrictions Critical study for SIDS endpoint
	29.10.2004
Type	: other: 4 generation
Species	: Rat
Sex	: male/female
Strain	: no data
Route of admin.	: other: oral feed (first 8 weeks paired feed technique; afterwards ad libitum)
Exposure period	: generation 1 and 2: lifelong; generation 3: 16 weeks; generation 4: until breeding
Frequency of treatm.	: continuously in diet
Premating exposure period	
Male	:
Female	:
Duration of test	:
No. of generation studies	: 4
Doses	: 0.5 or 1 % in diet (approx. 375 or 750 mg/kg/day)
Control group	: Yes
NOAEL parental	: >= 750 mg/kg bw
NOAEL F1 offspring	: >= 750 mg/kg bw
NOAEL F2 offspring	: >= 750 mg/kg bw
Method	: other
Year	: 1960
GLP	: No
Test substance	: other TS
Test substance	: benzoic acid, purity not noted
Method	: A robust protocol, according to standards at that time, was used. Taking into account the reputation of the investigators a high quality has to be assumed.
Test condition	: 40 (20 M = 20 F) rats/group; initial body weight: 40-50 g. The mean compound consumption was calculated according to Lehman, A.J., Assoc. Food Drug Off. Q. Bull. 18, 66 (1954)
Result	: In all 4 generations no influence on growth (weight, weight gain and food efficiency (measured by protein efficiency) and organ weights was found. In all 4 generations, no effects on fertility and lactation was found. The animals of the 3rd generation were sacrificed and examined histopathologically after 16 weeks (after lactation of the pups.) No remarkable histopathological findings were found. In the paper no information is given on the organs investigated, however the robustness of the total study, the reputation of the investigators, as well as the reputation of the Professor who did the histopathologic investigation, a high quality has to be assumed. From other parameters it can be assumed that as a minimum the brains, heart, liver, kidney, testis and were examined. Feeding of 0.5 % led to prolongation of survival compared to controls. In addition a so-called "Alters Paarang" after 48 weeks gave no influence on start of menopause.
Remark	: Benzoic acid was included in the benzoate category presented at OECD

5. Toxicity

Id 98-88-4

Date

	SIAM 13 in November 2001. Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
Reliability	: (2) valid with restrictions Meets generally accepted scientific standards, well documented and acceptable for assessment. Study conducted prior to the development of GLPs.	
Flag	: Critical study for SIDS endpoint	(28)
25.01.2005		
Type	: other:90 day toxicity	
Species	: Mouse	
Sex	: male/female	
Strain	: B6C3F1	
Route of admin.	: inhalation	
Exposure period	: 90 days	
Frequency of treatm.	: 6 hours/day, 5 days/week	
Premating exposure period		
Male	:	
Female	:	
Duration of test	:	
No. of generation studies	:	
Doses	: 10, 20, 50 ppm (nominal)	
Control group	: yes, concurrent vehicle	
Method	: other	
Year	: 1983	
GLP	: Yes	
Test substance	: other TS	
Test substance	: Hydrogen chloride (>99.99%), CAS No. 7647-01-0 Source: Matheson Gas Company (Code Number 9/82-426)	
Remark	: As presented at SIAM 13, 2001, No reliable studies have been reported regarding toxicity to reproduction and development in animals after oral, dermal or inhalation exposure to hydrogen chloride/hydrochloric acid. Because proton and chloride ion are the normal constituents in the body fluid of animal species, lower concentration of hydrogen chloride gas/mist or solution does not seem to cause adverse effects to animals. In fact, orally administered sulfuric acid did not cause developmental toxicity to laboratory animals, and this fact indicates that hydrogen chloride/hydrochloric acid is not expected to have developmental toxicity. In addition, no effects on the gonads were observed in a good quality 90-day inhalation study up to 50 ppm. Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint. No exposure related change were observed in the reproductive organs examined histo-pathologically.	
	For more detail - please see section 5.4.	
Source	: ATOFINA Chemicals Inc. Philadelphia	
Reliability	: (2) valid with restrictions	(14)
29.10.2004		

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

Species	: Rat
Sex	:
Strain	: no data

5. Toxicity

Id 98-88-4

Date

Route of admin.	: other: oral feed (first 8 weeks paired feed technique
Exposure period	: generation 1 and 2: lifelong; generation 3: 16 weeks
Frequency of treatm.	: continuously in diet
Duration of test	: Lifelong
Doses	: 0.5 or 1 % in diet (approx. 375 or 750 mg/kg/day)
Control group	: Yes
NOAEL maternal tox.	: >= 750 mg/kg bw
NOAEL teratogen.	: = 750 mg/kg bw
Method	: other
Year	: 1960
GLP	: No
Test substance	: other TS
Test substance	: Benzoic acid, purity not noted
Method	: A robust protocol, according to standards at that time, was used. Taking into account the reputation of the investigators a high quality has to be assumed.
Result	: The study demonstrated no effects on the dams or on the growth and development of the offspring.
Remark	: Benzoic acid was included in the benzoate category presented at OECD SIAM 13 in November 2001. Due to the quick hydrolysis of benzoyl chloride to benzoic acid and HCl, these compounds are used as surrogate data for this endpoint. The mean compound consumption was calculated according to Lehman, A.J., Assoc. Food Drug Off. Q.Bull. 18, 66 (1954).
Source	: ATOFINA Chemicals Inc. Philadelphia
Reliability	: (2) valid with restrictions
Flag	: Critical study for SIDS endpoint
28.10.2004	(27)
Species	: Other
Sex	:
Strain	:
Route of admin.	:
Exposure period	:
Frequency of treatm.	:
Duration of test	:
Doses	:
Control group	:
Remark	: As presented at SIAM 13, 2001, No reliable studies have been reported regarding toxicity to reproduction and development in animals after oral, dermal or inhalation exposure to hydrogen chloride/hydrochloric acid. Because proton and chloride ion are the normal constituents in the body fluid of animal species, lower concentration of hydrogen chloride gas/mist or solution does not seem to cause adverse effects to animals. In fact, orally administered sulfuric acid did not cause developmental toxicity to laboratory animals, and this fact indicates that hydrogen chloride/hydrochloric acid is not expected to have developmental toxicity. In addition, no effects on the gonads were observed in a good quality 90-day inhalation study up to 50 ppm.
Source	: ATOFINA Chemicals Inc. Philadelphia
28.10.2004	

5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

Type of experience	: Direct observation, clinical cases	
Remark	: Case-report: male, born 1929, engaged in manufacturing of benzoyl chloride from 1955-1969, since 1965 he suffered from frequent colds, bronchial pain, and anosmia. 1969 the skin of his hands coloured black with white and red spots and warts. Since 1971 daily coughing. 1973 diagnosis of a squamous cell carcinoma in the left hilum of the lung.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
06.02.2003		(38)
Type of experience	: Direct observation, clinical cases	
Remark	: Case-report: male, born 1926, engaged in manufacturing of benzoyl chloride from 1954-1969. Since 1970 he suffered from pain in the right chest and coughing, diagnosis by x-ray examination: lung cancer, death in 1972.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
06.02.2003		(38)
Type of experience	: Direct observation, clinical cases	
Remark	: Case-report: male, born 1916, working in an chemical plant somewhere until 1953, engaged in manufacturing of benzoyl chloride from 1954-1960. 1960 diagnosis by x-ray examination: lung cancer, death in 1963.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
06.02.2003		(38)
Type of experience	: Direct observation, clinical cases	
Remark	: Case-report: male, born 1923, engaged in manufacturing of benzoyl chloride from 1960-1970. Since 1970 he suffered from hemorrhagic rhinorrhoe. 1972 diagnosis: maxillary malignant lymphoma, death in 1973.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
06.02.2003		(38)
Type of experience	: Human - Epidemiology	
Remark	: A mortality study of workers in a factory producing chlorinated toluenes showed an increased risk of cancer mortality in workers who had first been employed prior to 1951.	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	
06.02.2003		(41)
Type of experience	: Human - Epidemiology	
Remark	: The results of a cohort study among workers in a factory manufacturing chlorinated toluenes (follow up period: 1964-1984) showed an excess mortality from lung cancer	
Source	: Bayer Corporation Pittsburgh ATOFINA Chemicals Inc. Philadelphia	

5. Toxicity

Id 98-88-4

Date

06.02.2003

(42)

Type of experience : Human - Epidemiology

Remark : The results of a cohort mortality study of employees exposed to chlorinated toluenes showed a statistically significant increase in lung cancer mortality among employees with 15 or more years of employment.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.02.2003

(53)

Type of experience : Direct observation, clinical cases

Remark : Case report: male, born in 1929, 1952-1969 engaged in manufacture of benzoyl peroxide, 1956-1963 engaged in the manufacture of benzoyl chloride as overtime work. 1969: suffering from a severe cold, x-ray examination: lung cancer, death: 1970. Necropsy: primary lung cancer with metastases in the pancreas, the kidneys and the back peritoneum.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.02.2003

(37)

Type of experience : Direct observation, clinical cases

Remark : case report: male, born in 1937, 1957-1961 working in benzoyl peroxide manufacturing process, 1960-1961 working in benzoyl chloride producing process as overtime work and 1961-1962 as regular work, 1962-1969 in the office, since 1962 suffering from a severe cough and dyspnoe, diagnosis: obstructive lung disease, 1972 x-ray examination: lung cancer, death in 1973

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.02.2003

(37)

Type of experience : Human - Epidemiology

Remark : An epidemiology study of all workers in a specific chemical plant calculated the expected number of lung cancer deaths as 0.22, but 2 were observed. Among benzoyl chloride workers specifically, the expected number of lung cancer deaths was 0.16, but the observed deaths were 2.

Source : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.02.2003

(39)

5.11 ADDITIONAL REMARKS

Type : **Toxicokinetics**

Remark : A single oral dose of labelled benzoyl chloride (9-13 mg/kg bw) administered to rats was rapidly absorbed from gastrointestinal tract. Elimination: 90 % via urine and 2 % via feces within 48 hrs. Radiocarbon in the blood peaked at about 4 ppm by 1 hr after dosing and then dropped rapidly to 0.02 ppm by 24 hrs. Total radiocarbon in all tissues were found to be low with 0.12 % present after 48 hrs. The

5. Toxicity

Id 98-88-4

Date 25.01.2005

- half-life of labelled benzoyl chloride in the blood was 1.5 hrs. Over 90 % of the metabolites in the urine were identified as benzoic acid and hippuric acid.
- Source** : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia (49)
- 06.09.2002
- Type** : other
- Remark** : Single inhalation: 10 rats/group, 2.0, 200 mg/L, 4 hrs, 14 days observation period.
200 mg/l: all rats died within the 4 hr-exposure period.
2 mg/l: mortality: 1/10; signs during exposure and up to d 7: increased motor activity followed by decreased motor activity, eye squint, salivation, lacrimation, both slight and marked dyspnea, nasal porphyrin discharge; from d 8 until the end of the study period the rats appeared normal.
- Source** : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia (49)
- 06.09.2002
- Type** : other
- Remark** : Benzoyl chloride did not show any effect on the metabolic cooperation in Chinese hamster V79 cells at non-cytotoxic concentrations.
- Source** : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia (4)
- 06.09.2002
- Remark** : Benzoyl chloride was identified as inducer of lipid peroxidation in liver, kidney, and spleen tissue in vitro.
- Source** : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia (18)
- 06.09.2002
- Remark** : Pretreatment of E.coli H/r30R with benzoyl chloride showed no effect on UV-induced mutagenesis
- Source** : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia (26)
- 29.07.1992
- Remark** : single inhalation: 5 rats/sex/group, Wistar TNO/W 74, m and f, saturated vapor, 1 h: no deaths; 3 h: no deaths; 7 h: mortality: 2/5 (m), 3/5 (f); all groups: respiratory disease, irritation of the visible mucous membranes of the eyes and the nose
- Source** : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia (9)
- 29.07.1992
- Remark** : Benzoyl chloride has no effect on wound healing when applied into an incision made on the dorsal skin tissue of male Wistar rats.
- Source** : Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia (52)
- 06.09.2002

5. Toxicity

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Remark

: Only a small amount of radioactivity was found in the urine and the feces after application of 10 ul labelled benzoyl chloride through a small incision on the dorsal musculature of male Wistar rats, measured over a period of 15 d. Organ distribution of radioactivity 3 d after application of 10 ul labelled benzoyl chloride through a small incision on the dorsal musculature of male Wistar rats:

Source

: Bayer Corporation Pittsburgh
ATOFINA Chemicals Inc. Philadelphia

06.07.1993

(52)

6.1 ANALYTICAL METHODS

6.2 DETECTION AND IDENTIFICATION

7. Eff. Against Target Org. and Intended Uses

Id 98-88-4
Date 25.01.2005

7.1 FUNCTION

7.2 EFFECTS ON ORGANISMS TO BE CONTROLLED

7.3 ORGANISMS TO BE PROTECTED

7.4 USER

7.5 RESISTANCE

8.1 METHODS HANDLING AND STORING

8.2 FIRE GUIDANCE

8.3 EMERGENCY MEASURES

8.4 POSSIB. OF RENDERING SUBST. HARMLESS

8.5 WASTE MANAGEMENT

8.6 SIDE-EFFECTS DETECTION

8.7 SUBSTANCE REGISTERED AS DANGEROUS FOR GROUND WATER

8.8 REACTIVITY TOWARDS CONTAINER MATERIAL

- (1) ACGIH. 2002. TLVs and BEIs
- (2) Auer-Technikum, Auerges. mbH Berlin, 12. Ausg. 1988
- (3) Aw T.C., Boyland E. 1981. IRCS Med. Sci: Libr. Compend. 9: 29-30.
- (4) Awogi T. et al. 1986. Mutat. Res. 164:263
- (5) Bayer AG data
- (6) Bayer AG data, Loeser E., 1978. Akute orale Toxizität, short report, November/03/1978
- (7) Bayer AG data, OC-P/Ökologie Study BSB-No 213, 1974-04-19
- (8) Bayer AG data, Report No. 8418, Benzoylchlorid, gewerbetoxikologische Untersuchungen, June/01/1979
- (9) Bayer AG data, Report No. 8418, June/01/1979
- (10) Bayer AG data. Report No 17635. January/23/1989. Benzoylchloride: Salmonella /Microsome test to evaluate for point mutagenic effects, preincubation method. (at the request of BG Chemie)
- (11) Bayer AG data. Report No. 17383. November/11/1988. Benzoylchloride: Micronucleus test on the mouse to evaluate for clastogenic effects, (at the request of BG Chemie)
- (12) Bruns, Mueller, Caspers. 2001. Institute of Environmental Analysis and Evaluation. Bayer AG study.
- (13) Chiu CH. W. et al. 1978. Mutat. Res. 58:11-22.
- (14) CIIT (1984), Ninety-day Inhalation Toxicity Study of Hydrogen chloride gas In B6C3F1 mice, Sprague-Dawley and Fischer-344 rats., ToxiGenics, 420-1087
- (15) CRC Handbook of Chemistry and Physics. 1999. David R. Lide, ed. CRC Press, New York. p 3-80, #2886.
- (16) Curtis M.W. and Ward C.H. 1981. J. Hydrol. 51:359-367
- (17) Curtis M.W. et al. 1979. Water Research 13:137-141.
- (18) Fraga C.G. et al. 1987. Free Radical Biol. Med. 3:119-123
- (19) Fukuda K. 1981. Ochanomizu Igaku Zasshi 29:69-81
- (20) Fukuda K. et al. 1981. GANN 72:655-664
- (21) Great Lakes Chemical Corporation. 04/25/78. Partition coefficients of several flame retardants and industrial chemicals. TSCA 8(d) submission. TSCATS Microfiche No. 206828.
- (22) Handbook of Environmental Data of Organic Chemicals. 2nd edition. 1983.

9. References

Id 98-88-4

Date

- (23) ITII, International Technical Information Institute, Tokyo, Japan. 1975. Cited in Chemical Hazard Information Profile (CHIP) Benzoyl Chloride, draft report, 1982.
- (24) Izmerov N.F. et al. 1982. Toxicometric parameters of industrial toxic chemicals under single exposure. Centre of International Projects, GKNT, Moscow, p. 25.
- (25) Kaiser K.L.E. et al. 1987. QSAR Environ. Toxicol. "Proc. Int. Workshop, 2nd Meeting Date 1986". Edited by: Kaiser K.L.E., Reidel, Dordrecht, Neth. pps.153-168.
- (26) Kawazoe Y. and Kato M. 1982. GANN 73:255-263
- (27) Kieckebusch, W. & Lang, K., *Arzneim.-Forsch.* 10, 1001-1003(1960)
- (28) Kieckebusch, W. & Lang, K., *Arzneim.-Forsch.* 10, 1001-1003(1960) as cited in the benzoic acid IUCLID presented at SIAM 13, 2001.
- (29) Loeser E. 1978. Bayer AG data, short report, November/03/1978.
- (30) Mabey W. and Mill T. 1978. Critical review of hydrolysis of organic compounds in water under environmental conditions. *J. Phys. Chem. Ref. Data.* 7:383-415.
- (31) McMahon R.E. et al. 1979. *Cancer Res.* 39:682-693.
- (32) Meylan W. and Howard P. 1999. EPIWin Modeling Program. Syracuse Research Corporation. Environmental Science Center, 6225 Running Ridge Road, North Syracuse, NY 13212-2510.
- (33) Ministry of Land, Infrastructure and Transport, Japan (1999). Test was conducted by Chemicals Evaluation and Research Institute, Japan.
- (34) Morrisson R.T. and BOYD R.N. 1973. *Organic Chemistry.*
- (35) Ohkubo T. et al. 1996. *Jap. J. Environm. Chem.* 6:533-540.
- (36) Safety Data Sheet. ELF ATOCHEM, UK. December, 1992
- (37) Sakabe H. and Fukuda K. 1977. *Ind. Health* 15:173-174
- (38) Sakabe H. et al. 1976. *Ann. NY Acad. Sci.* 171:67-70
- (39) Sakabe H. et al., *Ann. NY Acad. Sci.* 171, 67-70 (1976)
- (40) Shashidhar M.A., 1971. Electronic absorption spectra of some monosubstituted benzenes in the vapour phase. *Spectrochimica Acta.* 27A:2363-2372.
- (41) Sorahan T. et al. 1983. *Ann. Occup. Hyg.* 27:173-182
- (42) Sorahan T., Cathcart M. 1989. *Br. H. Indust.Med.* 46:425-427
- (43) Stratton, G.W. & Corke, C.T., *Environ. Pollut.* 29, 71-80 (1982) as cited in the benzoic acid IUCLID presented at SIAM 13, 2001.

9. References

Id 98-88-4

Date

- (44) Stratton, G.W. & Corke, C.T., Environ. Pollut. 29, 71-80(1982) as presented at SIAM 13, 2001.
- (45) Syracuse Research Corporation calculated values, 1988.
- (46) Tokimoto K. et al. 1978, cited in Chemical Hazard Information Profile (CHIP) Benzoyl Chloride, draft report, 1982.
- (47) Unpublished study (IRDC#163-676). 4-week Subacute inhalation toxicity study of benzoic acid in rats withamendment. (1981) as cited in the benzoic acid IUCLID presented at SIAM 13, 2001.
- (48) USEPA. 1985. GEMS: Graphical Exposure Modeling System. Fate of atmospheric pollutants data base. Office of toxic substances.
- (49) Velsicol Chem Corp. 1980. Mutagenicity evaluation of benzoylchloride in the Ames Salmonella/microsome plate test. EPA-OTS0107.
- (50) Velsicol Chem Corp. 1974. Acute toxicity studies in rats and rabbits. EPA-OTS0107. Report # 163-281.
- (51) Verscheuren K. 1983. Handbook of Environmental Data of Organic Chemicals. Second edition. p. 282
- (52) Wang P.Y. and Evans D.W. 1977. Biomed. Med. Dev. Art. Org. 5:277-291
- (53) Wong O. 1988. Am. J. Indust. Med. 14:417-431
- (54) Yasuo K. et al. 1978. Mutat. Res. 58:143-150.
- (55) Yoshimura H. et al. 1979, cited in Chemical Hazard Information Profile (CHIP) Benzoyl Chloride, draft report, 1982
- (56) Yoshimura H. et al. 1986. Sangyo Igaku (Jpn.J.Ind.Health) 28:352-359

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10.1 END POINT SUMMARY

10.2 HAZARD SUMMARY

10.3 RISK ASSESSMENT